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TECHNICAL SERIES, NO. 12, PART III.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.
L. O. HOWARD, Entomologist and Chief of Bureau.

MISCELLANEOUS PAPERS.

A CONTRIBUTION TO OUR KNOWLEDGE OF THE THYSANOPTERA OF CALIFORNIA.

By DUDLEY MOULTON,
Engaged in Deciduous-Fruit Insect Investigations.

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Entomology,
Washington, D. C., February 5, 1907.

Sir: I have the honor to transmit herewith the manuscript of a paper by Mr. Dudley Moulton, special agent in this Bureau, entitled "A Contribution to our Knowledge of the Thysanoptera of California." This paper embodies the results of some work carried on by Mr. Moulton while a student at the Leland Stanford Junior University, Palo Alto, Cal., and forms part of a thesis for the degree of Master of Arts in the Department of Entomology at that institution. It contains keys and descriptions for the identification of the various species of thrips found to occur in California. The group of insects treated is one of economic importance, containing, as it does, species which are injurious to various field crops, fruit trees, and ornamental plants. I recommend the publication of the paper as Technical Series. No. 12, Part III, of this Bureau.

Respectfully,

L. O. Howard,
Entomologist and Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

PREFACE.

The systematic treatment of the Thysanoptera of California, which is presented in this paper, is the direct outgrowth of an investigation of the pear thrips (*Euthrips pyri* Daniel) which was undertaken in the Santa Clara Valley of California during the period from January, 1905, to April, 1906. This insect has become a serious fruit-tree pest in the deciduous-fruit sections around the San Francisco Bay. An important phase of the investigation was to learn the insect's distribution and the number of its food plants, both wild and cultivated. In looking for *Euthrips pyri* on various plants, naturally many other species of thrips were found, and much of interest learned regarding the life habits of several of them. It is the object of this paper to bring together these various observations and also the results of the more technical part of the work, leaving the economic treatment of the pear thrips for a separate paper.

The investigation of the pear-thrips problem in the Santa Clara Valley, as also the collecting of specimens described herein, was made possible by the very liberal attitude of the Santa Clara County board of supervisors, who granted everything necessary for a thorough and scientific study. The very careful and efficient work of the writer's two assistants, Mr. Earl L. Morris and Mr. C. T. Paine, must also be acknowledged. To Prof. Vernon L. Kellogg, professor of entomology in the Leland Stanford Junior University, the writer wishes to express his gratitude for encouragement, helpful suggestions, and friendly criticism.

D. M.

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MISCELLANEOUS PAPERS.

A CONTRIBUTION TO OUR KNOWLEDGE OF THE THYSANOPTERA OF CALIFORNIA.

By Dudley Moulton, *Special Agent.*

INTRODUCTION.

Upon undertaking a study of the life history of the pear thrips (*Euthrips pyri*), and incidentally of other thrips as they came to notice, the writer was impressed by the great deficiency in our knowledge of these insects. In California it seemed, indeed, that new species could be collected on almost every side, and when trying to classify these specimens it was found that the individuals possessed most of the characteristics which would place them readily in any certain genus, but that there would often be found striking though minor differences. In several cases it has been necessary to extend the original generic descriptions to include California forms.

In a short published account of California thrips,[a] Miss Daniel states that previous to that time (1904) four species of thrips were known to exist in California. To this number her paper would add five. The writer finds, however, that one of her species, *Caliothrips woodworthi*, is the already described *Heliothrips fasciatus* of Pergande. Thus only eight were known previous to 1906. The writer has been able to gather abundant specimens of all of these thrips and now adds sixteen more new species and two varieties, making a total of twenty-six. It has been necessary to erect a new genus to include the species *Orothrips kelloggii*. The genus *Megalothrips*, represented by *Megalothrips hesperus*, has not before been recorded as found in America.

Economically considered, the thrips constitute an important group in California, because of the ravages of several species. Growers of deciduous and citrus fruits and of garden truck and nurserymen and florists have suffered at times very considerably, but not until

[a] New California Thysanoptera. By S. M. Daniel. Ent. News, Vol. XV, No. 9, pp. 293–297, November, 1904.

the conditions in the Santa Clara Valley became so grave that something had to be done was any very serious study given to these insects.

Orange growers in southern California were made very apprehensive a few years ago by the appearance of small brown spots on their oranges, caused by the feeding of the grass thrips (*Euthrips tritici* Fitch). The injury was, however, superficial, as a spot only was produced on the orange peel, the quality of the fruit being in no way injured nor its qualities of keeping affected. Yet because of the spots many of the best oranges had to be passed out as culls. This same thrips has been reported injuring alfalfa by its feeding within the blossoms. The damage was hardly noticed when the alfalfa was cut for hay, but for seed purposes the crop was an almost absolute failure. The grass thrips is everywhere present in wild and cultivated flowers and in blossoms of most of the indigenous trees. The writer has often been able to collect hundreds of specimens of this thrips with a single sweep of the net from the blossoms of the California sage (*Artemisia californica*), and from the manzanitas, especially *Arctostaphylos tomentosa*. This thrips is perhaps seen most commonly in our garden flowers—roses, lilacs, etc.—and does little or no apparent injury. Often, however, one finds ill-shaped and partly dead outer petals of rose buds or even full-blown roses. This injury, when not caused by mildew, can be quite easily traced to the grass thrips, which feeds in the tip of the bud on the outer end of the petals, just before or while the petals are spreading. This injury is common, but as roses unfold rapidly, the larger, inner petals are not injured, and the outer, smaller, imperfect ones may be picked off and the rose left apparently perfect. This species is perhaps the most widespread of all the thrips. Only at intervals does its injury render it a pest. Its appearance is very like that of the pear thrips (*Euthrips pyri*), and to the casual observer either species could easily be mistaken for the other.

The feeding injuries of *Heliothrips hæmorrhoidalis* are limited largely to azaleas, cherry laurel, and laurestina, and to greenhouse and other ornamental shrubs. The writer has found in greenhouses azalea plants which have been completely killed by these insects. Affected laurestina plants produce contorted, ragged, and pale leaves.

The injury of *Trichothrips ilex* on the Christmas berry (*Heteromeles arbutifolia* is noticeable wherever that plant grows. This insect has been found only on the one plant, and it is interesting to note that the plant is indigenous only to limited areas in the Coast Range region near San Francisco Bay. The Christmas berry is one of the showiest of California shrubs when, from November to January, it displays its fine clusters of crimson berries. When the plants are badly infested with thrips the leaves are deformed and ragged and the weakened blossoms produce small and imperfect berries. The

berries have no special value commercially, but in their perfect state are used extensively for Christmas decorations.

The onion thrips (*Thrips tabaci* Lind.) finds an almost ideal habitat in the extensive onion-seed farms in California, and its injury to this plant in some sections and during some years is almost prohibitive of onion growing.

Especially to be mentioned, however, is the injury caused by the pear thrips (*Euthrips pyri* Daniel). This is strictly a fruit-tree pest, attacking as it does nearly all varieties of deciduous fruits. No other thrips is recorded as having done so much damage as has this one, and the problem for its control is a difficult one to solve. The writer's experience has been that, outside of purely cultural methods, we have no effective artificial means for checking it. Its natural insect enemies are few, and from the very nature of the pest's life habits it can not be controlled effectively by those beneficial forms which are already present. A parasitic fungus has for the time being proved a quite effective check, but the weather conditions, moist and warm for two years past (during 1905 and 1906), have been almost ideal for the growth of such fungi, and it is extremely doubtful if this check would prove at all effective under other conditions. The pear thrips is limited in its distribution to the deciduous-fruit areas around San Francisco Bay.

It is interesting to note the relations of some of the California thrips to their food plants. *Orothrips kelloggii* is found only in blossoms of manzanita and madroña—both trees peculiarly Californian—whose cup-shaped blossoms afford an ideal home for this striking thrips. *Æolothrips kuwanaii* is common only in the wild California lilac. *Trichothrips ilex* is peculiar to the Christmas berry, and has thus far been collected from no other plant. *Euthrips pyri* is limited in its feeding to cultivated fruits. *Cryptothrips californicus* is most often found under the old shells of the brown apricot scale (*Lecanium armeniacum*) and the black scale (*Saissetia oleæ*). It has been taken from these places mostly during the winter, and it may be that it is under the old shells only for protection, but the writer suspects that it may be a scavenger.

In preparing this paper the writer has introduced descriptions of genera only when it has been necessary to extend the characters to include California species. For other generic descriptions the reader is referred to Hinds's monograph of the North American forms.[a]

The already recognized characters of ovipositor, wings, antennæ, and mouth appendages are the principal ones here used in the keys for classifying the species. In describing new thrips the writer has made

[a] Contribution to a Monograph of the Insects of the Order Thysanoptera Inhabiting North America. By Warren Elmer Hinds. Proc. U. S. Nat. Mus., Vol. XXVI, No. 1310, pp. 79–242, Pls. I–XI, December 20, 1902.

the customary measurements, and, in addition, has reduced the lengths of antennal segments to microns. In most other respects the plan adopted by Hinds has been followed. The writer has redescribed the three species of Miss Daniel (*Cryptothrips californicus*, *Euthrips pyri*, and *Sericothrips apteris*) to make their descriptions conform with the others.

CLASSIFICATION OF CALIFORNIA THYSANOPTERA.

KEY TO THE SUBORDERS AND FAMILIES.

I. Female with a saw-like ovipositor. Terminal abdominal segment of female conical, of male usually broadly rounded. Wings usually present; fore pair strongest, with more or less well-developed veins; double fringed behind. Membrane of wings with microscopic hairs.....Suborder TEREBRANTIA.

A. Antennæ with nine segments. Fore wings broad and rounded, with prominent ring vein and cross veins. Ovipositor upcurved.....(A) Family ÆOLOTHRIPIDÆ.

B. Antennæ with six to eight (nine?) segments. Wings present or absent; when present usually narrow and pointed at tips. Ovipositor downcurved.....(B) Family THRIPIDÆ.

II. Female without ovipositor. Terminal abdominal segment tubular in both sexes. Wings usually present, both pairs similar; front pair with only a rudimentary, median, longitudinal vein; wings with simple fringe on both margins except fore wing, which is double fringed on posterior edge near tip by a few hairs; membrane of wings without microscopic hairs. Antennæ eight-segmented.....Suborder TUBULIFERA.

(C) Family PHLŒOTHRIPIDÆ.

KEY TO THE GENERA.

(A) Family ÆOLOTHRIPIDÆ.

1. All segments of antennæ freely movable and diminishing in size gradually at tip. Maxillary palpi seven-segmented, labial palpi four-segmented.....(1) *Orothrips*, new genus.
2. Last four segments of antennæ closely united and together shorter than the fifth. Maxillary palpi three-segmented, labial palpi four-segmented.

(2) *Æolothrips* Haliday.

3. *Caliothrips* Daniel.[a]

(B) Family THRIPIDÆ.

1. Antennæ with eight segments (nine?).

a. Wings wanting; prothorax almost as large as pterthorax; body with or without reticulated structure.....(3) Genus *Sericothrips* Haliday.

a'. Wings fully developed.

b. Body with markedly reticulate surface; last segment of antenna drawn out and very much longer than the seventh.

(4) Genus *Heliothrips* Haliday.

b'. Body without reticulate structure; eighth antennal segment only a little longer than the seventh.

(5) Genus *Euthrips* Targione-Tozzetti.

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[a] *Caliothrips woodworthi*, new genus and species, was described in Entomological News for November, 1904 (Vol. XV, No. 9, pp. 296–297). The writer of the present paper has been unable to see the type specimen, but from the description believes that it will prove to be none other than the male of *Heliothrips fasciatus* Pergande, or a closely related species.

(B) Family THRIPIDÆ—Continued.

2. Antennæ with seven segments.

a. Fore wings broad, reticulated and without front fringe.

(6) Genus *Parthenothrips* Uzel.

a'. Fore wings narrowed near tip; fringe present on anterior margin.

(7) Genus *Thrips* Linnæus.

(C) Family PHLŒOTHRIPIDÆ.

1. Head about as long as broad .....(8) Genus *Trichothrips* Uzel.

2. Head markedly longer than broad.

a. Fore femora armed with tooth at tip....(9) Genus *Acanthothrips* Uzel.

a'. Fore femora without such tooth.

b. Head more than twice as long as wide; males with prominent clasping organs projecting from the side of sixth segment; very large thrips.....(10) Genus *Megalothrips* Uzel.

b'. Head about one and one-half times as long as wide; males without such clasping organs.....(11) Genus *Cryptothrips* Uzel.

KEY TO THE SPECIES.

1. Genus *Orothrips*, new genus.
   Represented by one species .....(1) *O. kelloggii*, new species.
2. Genus *Æolothrips* Haliday.
   Represented by one species and a variety.....(2) *A. kuwanaii*, new species.
   (3) *A. kuwanaii robustus*, new variety.
3. Genus *Sericothrips* Haliday.
   a. Body very dark brown, nearly black; pterthorax yellow; legs brown.
   (4) *S. apteris* Daniel.
   b. Body uniform brown; surface of body strongly reticulated; legs yellow.
   (5) *S. reticulatus*, new species.
   c. Body and legs uniform brown; four stout spines on the dorsal side of segment 9 .....(6) *S. stanfordii*, new species.
4. Genus *Heliothrips* Haliday.
   a. All legs yellow; antennæ twice as long as head; wings slender, with one distinct longitudinal vein in center; small darkened area near base. Food plants are azaleas, laurestinas, dahlias, etc.
   (7) *H. hæmorrhoidalis* Bouché.
   b. Legs brown, with tips of femora, both ends of tibiæ, and tarsi light-brown to yellow; antennæ one and one-half times as long as head; wings gray-brown with two transparent-white cross-bands, one at base and one at three-fourths the wings' length; two longitudinal veins, the second branching from the first near the broadened base of the wing, the first uniting with the costa to form the fore part of a strong ring vein.
   (8) *H. fasciatus* Pergande.
5. Genus *Euthrips* Targioni-Tozzetti.
   a. Without prominent spines on fore angles of prothorax; longitudinal veins not regularly set with spines.
   b. Head noticeably wider than long; sense cones on segments of antennæ very long and slender; general color of body light lemon-yellow.
   (9) *E. orchidii*, new species.
   b'. Head about as wide as long; general color of body brown.
   c Basal segment of antenna concolorous with head and with segment 2; postocular spines wanting; two spines on posterior part of thorax dividing the hind margin into equal portions; about sixteen spines on hind vein of fore wing; general color brown to dark brown .....(10) *E. pyri* Daniel.

5. Genus *Euthrips* Targioni-Tozzetti—Continued.

c′. First segment of antenna of a lighter color than head and lighter than segment 2; postocular spines present and of medium length; three small spines bordering hind margin of prothorax on either side; posterior vein of wing with about twelve spines.
(11) *E. ehrhornii*, new species.

a′. With spines on fore angles of prothorax; longitudinal veins set regularly with spines.

b. Fore tibia armed at end with tooth..(12) *E. ulicis californicus*, new species.

b′. Fore tibia without such tooth.

c. General color of body brown to dark brown; individuals small, total length less than 1 mm.; with several quite long spines but with no short ones along posterior margin of prothorax.
(13) *E. minutus*, new species.

c′. General color of body yellow to brown; with a circlet of several large and several small spines bordering posterior margin of prothorax.

d. Fifth antennal segment about five-sixths as long as 4.
[a](14) *E. occidentalis* Pergande.

d′. Fifth antennal segment about two-thirds as long as 4.
[a](15) *E. tritici* Fitch.

6. Genus *Parthenothrips* Uzel.

Represented by one species.....(16) *P. dracænæ* Heeger.

7. Genus *Thrips* Linnæus.

a. Head noticeably wider than long.

b. Body color dark brown, thorax and other parts often orange tinted, inner crescents bordering ocelli orange-red; wings light brown with lighter colored area near base; body length about 1.25 mm.
(17) *T. madronii*, new species.

b′. Body color light yellow to light brown, inner crescents of ocelli light brown; wings uniform light colored; body length about 1 mm.
(18) *T. tabaci* Lindeman.

a′. Head as long or longer than wide; body long and slender; color almost transparent, sometimes shaded light brown.
(19) *T. bremnerii*, new species.

8. Genus *Trichothrips* Uzel.

a. Postocular spines wanting; all prominent spines on thorax and abdomen with blunt tips; antennæ about two and one-half times as long as head; each fore tarsus armed with a large tooth.
(20) *T. dens*, new species.

a′. Postocular spines prominent; body spines normal; antennæ not over twice as long as head; each fore tarsus armed with a small tooth.

b. Sides of head almost straight; fore femora of males greatly enlarged; fore tibiæ and tarsi and segments 3 to 6 of antennæ yellow.
(21) *T. femoralis*, new species.

b′. Sides of head slightly arched; fore femora of males not more than twice as broad as tibiæ; all tarsi and segment 3 of antennæ yellow.
(22) *T. ilex*, new species.

b″. All tarsi gray-brown and only base of segment 3 of antennæ yellow.
(23) *T. ilex dumosa*, new variety.

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[a] Many specimens of these two species have been examined and the variations in size, color, and relative lengths of antennal segments are so great that no sharp dividing line between the two species can be drawn.

9. Genus *Acanthothrips* Reuter.
   Represented by a single species .....(24) *A. doanei*, new species.
10. Genus *Megalothrips* Uzel.
   Represented by a single species.....(25) *M. hesperus*, new species.
11. Genus *Cryptothrips* Uzel.
   Represented by a single species .....(26) *C. californicus* Daniel.

Family ÆOLOTHRIPIDÆ.[a]

The antennæ are nine-segmented. Ocelli are present in both sexes. The maxillary palpi are three to seven segmented; labial palpi are four or five segmented (sometimes two segmented in European forms). The wings are large, broad, and rounded at the outer ends. Each fore wing has a heavy ring vein and two longitudinal veins extending from base to near tip; each fore wing has from three to five cross-veins; the fore wings are without a fringe on the front margin. Both sexes bear a peculiar thumb and fore-finger-like hook on the outer side of the second segment of each fore tarsus. The ovipositor of the female is upturned. Males have the first abdominal segment much longer than the second. The members of this family have very long legs.

1. Genus OROTHRIPS, new genus.

Head wider than long. Ocelli present in both sexes. Antennæ nine-segmented, all sutures freely movable; third and fourth about equal in length. Maxillary palpi geniculate, seven-segmented; labial palpi five-segmented. Prothorax about one-third wider than long, its hind margin bordered with several quite strong spines on either side. Legs long and slender; fore femora thickened in both sexes; all tibiæ armed. Second fore tarsal segment in both sexes with hook-like appendage. Wings present in both sexes, broader in distal third, narrower near base. Anterior part of ring vein and two longitudinal veins thickly set with stout spines. Fore wing with two broad, darkened cross-bands near center and tip respectively, also darkened area near base.

(1) **Orothrips kelloggii**, new species. (Pl. I, figs. 1–4.)

Measurements: Head, length 0.16 mm., width 0.22 mm.; prothorax, length 0.16 mm., width 0.28 mm.; mesothorax, width 0.43 mm.; abdomen, width 0.41 to 0.50 mm.; total body, length 1.80 mm. Antennæ: 1, 36μ; 2, 54μ; 3, 114μ; 4, 108μ; 5, 60μ; 6, 45μ; 7, 42μ; 8, 24μ; 9, 33μ; total, 0.51 mm. General *color* dark brown, sometimes light brown, prothorax and abdomen shaded with orange.

Head about one-fifth wider than long and about as long as and retracted into prothorax; cheeks strongly arched; back of head transversely striated and clothed with small spines, a single pair posterior to ocelli, largest. *Eyes* large, black, with light posterior margin,

[a] It has been necessary to extend the characters of the family Æolothripidæ as given by both Uzel and Hinds in order to include California forms.

pilose, with large prominent facets. *Ocelli* orange colored, granulated, separated, and margined inwardly with dark orange-brown crescents; posterior ocelli approximate to but not bordering inner margin of eyes. *Mouth-cone* short, reaching about halfway across the prothorax, maxillary palpi geniculate, seven-segmented, first segment very large and almost as long as the other six; labial palpi five-segmented. *Antennæ* nine-segmented, uniform dark brown except tip of segment 2, which is light brown, and base of 3, which is yellow; all segments quite uniformly clothed with short dark hairs; segments 3 and 4 each with two elongated, light-colored, membranous sense areas on outer side, one dorsal and one ventral; segments 5 and 6 each with a simple sense cone on under side near tip.

Prothorax about one-third wider than long, constricted in the center of sides, very faintly cross-striated, uniformly covered with numerous spines; circle of twelve quite stout spines on posterior margin. *Mesonotum* striate-reticulate; with several stout spines, two on each side, two near center, and two on posterior margin. Mesothorax largest, quite smoothly and evenly rounded at union with metathorax; sides converge gradually toward the posterior. *Legs* unicolorous with body, except trochanters, tips of fore tibiæ, and fore tarsi, which shade to yellow; fore coxæ and femora thickened, other legs long and slender, legs thickly covered with short spines; fore tarsi each with thumb and forefinger-like hook; all tibiæ armed with spines near tip, hind tibiæ with several and a double row on inner side. Fore *wings* broadest near tip, narrower near base; anterior margin broadly rounded at tip, posterior margin nearly straight outward from scale; fore wings with a ring vein, two longitudinal and five cross veins; longitudinal veins and anterior part of ring vein thickly and regularly set with short spines. These spines are dark except on inner light area, where they are white. Fore *wings* without anterior fringe and with hairs on the posterior margin which do not average as long as the width of the wing; wings clear white with three darkened areas, one at base, one at tip, and a large irregular area near center. All cross veins are included in or margin on this central darkened area. Scales at base long and slender, each bears seven spines. Hind wings clear white and without veins; margined in front with short and behind with long simple fringe.

Abdomen ovate, or strongly spindle-shaped when distended; fourth and fifth segments largest, tapering gradually from fifth to the tip; segments 1 to 7 with a few short inconspicuous hairs on prominent angles; segment 8 with a single pair of stout spines; segment 9 with three long and several short pairs.

Males are similar, but with long, slender bodies.

Described from nine females and six males.

Food plants: Manzanita and madroña blossoms.

Habitat: Santa Clara Valley, California.

2. Genus ÆOLOTHRIPS Haliday.[a]

Head about as broad as long. Ocelli present in both sexes. Antennæ nine-segmented, the last four segments closely joined and together shorter than the one preceding; the third segment longest. Maxillary palpi three-segmented and geniculate. Prothorax about as long or a little longer than the head, without large bristles. Legs very long and slender; fore femora somewhat thickened in both sexes; fore tibiæ usually unarmed, although sometimes armed; second fore tarsal segment in both sexes with hooklike appendage. Wings usually present in both sexes; fore wing somewhat narrowed before the middle; fore part of ring vein furnished with very short hairs, which hardly overreach the edge of the wing and which increase in length toward the tip. Fore wings white, with dark cross or longitudinal bands. First abdominal segment in the males is much longer than the second, and the ninth is drawn out at the hind angles into short clasping organs or hooks.

(2) **Æolothrips kuwanaii**, new species. (Pl. I, figs. 5–8.)

Measurements: Head, length 0.13 mm. (varying to 0.16 mm.), width 0.17 mm. (to 0.18 mm.); prothorax, length 0.16 mm., width 0.20 mm.; mesothorax, width 0.30 mm.; total body, length 1.66 mm. Antennæ: 1, 36μ; 2, 51μ; 3, 84μ; 4, 81μ; 5, 69μ; 6, 7, 8, and 9, 51μ; total, 0.37 mm. *Color* of insect brown—sometimes dark brown—with conspicuous red pigment blotches, this red showing especially vivid through the membranous parts between the segments.

Head about as wide or only a little wider than long, rounded in front and only slightly elevated between basal segments of antennæ; cheeks arched; back of head faintly cross-striate with one especially prominent line near posterior margin; with several not prominent spines. *Eyes* prominent, black; with large facets, pilose. *Ocelli* present, placed well forward on anterior part of head, posterior ocelli contiguous with inner margin of eyes, orange-yellow and margined inwardly with deep orange crescents. *Mouth-cone* long, reaching to posterior margin of prothorax, pointed bluntly; maxillary palpi three-segmented, basal segment large, terminal one very small. *Antennæ* nine-segmented, two and one-half times as long as head; brown, unicolorous with body except segment 3, which is lemon-yellow shaded light-brown at tip; all segments except basal one thickly and uniformly clothed with short spines, those on tip of 2 are stoutest, spines on segments 1, 2, 4, and 5 are brown, those on 3 and style are white; sense area on 3 long and slender, on 4 a similar larger area; a simple sense cone on lower side of segment 6 near tip.

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[a] Genus modified to include California forms. *Æolothrips kuwanaii* differs only in minor details from the *Æolothrips* of other writers, so that it seems best to extend this genus rather than to create a new one.

Prothorax a little wider than long, and only slightly larger than head, with an emargination and thickening of the wall near center of each side; clothed with numerous small spines. *Mesothorax* largest; *metathorax* with sides almost straight and parallel except near posterior edge, where they turn abruptly inward. *Legs* dark brown, fore femora thickened, fore and second tibiæ armed at tip with two strong spines, last tibiæ with several spines at tip, and with two rows of smaller ones on inner side; each fore tarsus armed with a stout hook and tooth; all legs thickly set with small spines. Fore *wings* broadly rounded at tips, with two longitudinal veins which unite with ring vein near tip; with three cross veins and the vestige of a fourth; second longitudinal vein set with about twenty-six short, dark spines; spines also present on first longitudinal vein, but white and not conspicuous. Anterior margin of wing without fringe; hind margin with long, double fringe. Wings clear white, with dark brown longitudinal band covering posterior half from near base to near tip. Microscopic hairs on light-colored area white, those on darkened area brown. Hind pair of wings clear white, excepting a small, light brown longitudinal area near base; without veins; margined in front with short and on hind edge with long simple fringe.

Abdomen elongate-ovate, about one-third as wide as long. All segments uniform brown, with light brown intersegmental membrane, splashed conspicuously with red pigment; segments 2 to 7, inclusive, each with a dark cross line near anterior margin. Segments 1 to 8 without conspicuous hairs or spines; segment 9 bears eight long and several smaller spines along posterior margin. The three last segments form the sheath for the large upturned ovipositor.

Males are much smaller, with antennæ almost uniform brown and abdomen furnished with large clasping organs at tip.

Described from nine females and three males.

Food plant: California lilac (*Ceanothus thyrsiflorus*).

Habitat: Saratoga, Santa Clara County, Cal.

(3) **Æolothrips kuwanaii, variety robustus.**

Measurements: Head, length 0.16 mm, width 0.20 mm; prothorax, length 0.20 mm, width 0.23 mm; width of mesothorax 0.38 mm; total body length 2.4 mm. Antennæ: 1, 36μ; 2, 60μ; 3, 114μ; 4, 69μ; 5, 69μ; 6, 7, 8, and 9, 51μ; total 0.38 mm. *Color* quite uniform dark brown, with conspicuous red pigment blotches; the third antennal segment is light brown, with a touch of purple pigment at its base.

A single specimen of this insect, which is about one-third larger than *A. kuwanaii*, has been taken from an apricot tree near Cupertino, Cal.

Family THRIPIDÆ.

(3) Genus SERICOTHRIPS Haliday.

Body broad and having a silky luster, due to the presence of numerous minute spines on the abdominal segments. Head fully one and one-half times as wide as long. Eyes large and protruding; ocelli present in both sexes. Antennæ eight-segmented. Maxillary palpi three-segmented. Prothorax much longer than the head, without long spines at hind angles. Legs, especially hind pair, quite slender. Wings either reduced or fully developed; when present the fore wing is broad at basal fourth, the remainder being very narrow; only one longitudinal vein developed; fore fringe long; spines on veins numerous and moderately developed; abdomen in some species strongly arched and its segments broad and short; tip of abdomen conical in both sexes; abdomen of male much more slender throughout. (After Hinds.)

To include California forms this genus must be extended as follows: Head may be almost as long as wide; ocelli wanting; maxillary palpi two or three segmented; head may be as long as prothorax; legs medium stout. The three California forms now recognized are wingless.

(4) Sericothrips apteris Daniel.

Measurements: Head, length 0.13 mm., width 0.16 mm.; prothorax, length 0.13 mm., width 0.2 mm.; length of pterthorax 0.08 mm., width 0.26 mm.; width of abdomen 0.40 mm.; total body length 0.65 to 1.0 mm. Antennæ: 1, 18μ; 2, 39μ; 3, 45μ; 4, 39μ; 5, 36μ; 6, 54μ; 7, 15μ; 8, 18μ; total, 0.25 mm. General *color* very dark brown, pterthorax lighter, abdomen almost black.

Head rounded in front, elevated between bases of antennæ; back of head cross-striate, with a spine on each side just inward from each eye and several posterior to eyes; cheeks arched, sides roughened. *Eyes* prominent, not pilose; together they occupy about one-half the width of the head. *Ocelli* wanting. *Mouth cone* long, extending to mesothorax, tipped with black; maxillary palpi three-segmented. *Antennæ* eight-segmented, basal joints widely separated; first two segments broadest; suture near tip of segment 6, which often makes the antennæ appear nine-segmented; spines prominent; color quite uniform brown.

Prothorax of even length with head, sides evenly arched, with a few not prominent spines; pronotum faintly reticulate-striate; color dark brown. *Pterthorax* not nearly so long as head, narrow in front, diverging posteriorly; color orange-yellow to light brown; surface marked with transverse reticulating wrinkles; wings wanting. *Legs* moderately stout; hind femora with spines at tip; color brown, tibia and tarsi shading yellow.

Abdomen broadly oval; segments 2 to 7, with an irregular row of about twelve spines along posterior margin; spines on last two segments short but quite strong; color very dark brown to almost black.

Redescribed from numerous specimens including several cotypes kindly furnished by Miss Daniel.

Food plant: Grass.

Habitat: Counties about San Francisco Bay, California.

This species is described in Entomological News for November, 1904, page 295. I have taken specimens from grass on the campus of the University of California, at Berkeley, Cal., where it was first found, and from the same food plant in the Niles Canyon, Alameda County, and on the campus of the Leland Stanford, Jr., University, Palo Alto, Cal. It is easily distinguished from the other species of the genus in that the pterthorax is decidedly lighter colored than the rest of the body, which is very dark brown to brown-black.

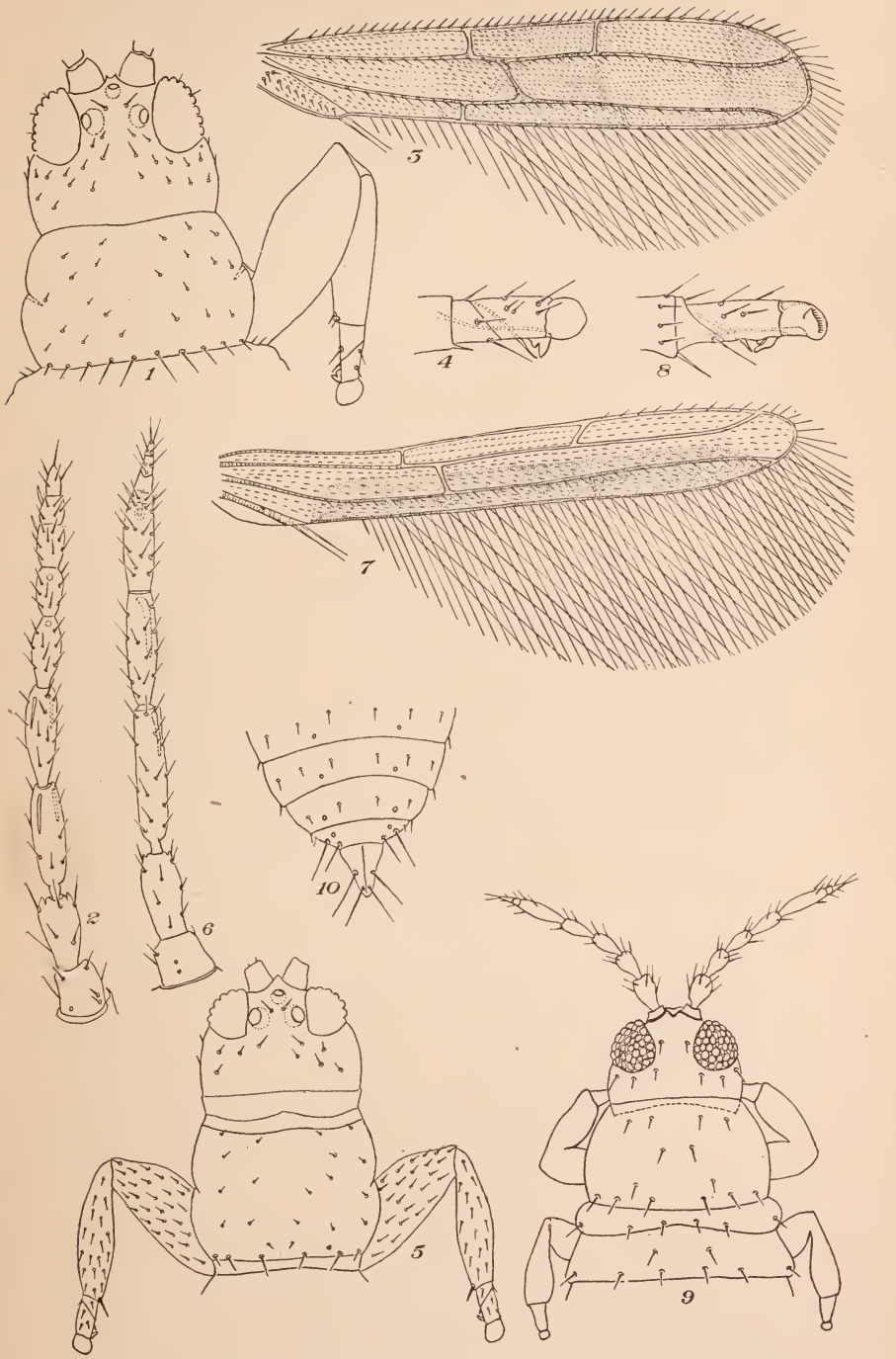
(5) **Sericothrips reticulatus**, new species. (Pl. I, figs. 9, 10.)

Measurements: Head, length 0.16 mm., width 0.20 mm.; prothorax, length 0.18 mm., width 0.26 mm.; abdomen, width 0.48 mm.; total body length 1.41 mm. Antennæ: 1, 21μ; 2, 48μ; 3, 54μ; 4, 54μ; 5, 51μ, 6, 69μ; 7, 12μ; 8, 21μ; total, 0.336 mm. *Color* brown, head and thorax lighter, and abdomen shading to dark brown at tip; legs yellow. Body increasing in size gradually from head to sixth abdominal segment, from where it tapers abruptly to the small ninth and conical tenth.

Head small as compared with other segments of body; cheeks arched, edges roughened; frons with two prominent darkened angles directly above basal segments of antennæ and with an intermediate angular depression. Head surface strongly reticulate, with no conspicuous spines and with but few very small hairs. *Eyes* large, prominent, with coarse facets, not pilose, with light-colored outer borders, pigment very dark purple. *Ocelli* absent. *Mouth cone* broad, pointed bluntly at tip; maxillary palpi two-segmented. *Antennæ* eight-segmented, slightly more than twice as long as head, segments almost uniform brown, sense hairs light colored and inconspicuous.

Prothorax but slightly longer than head. It bears a few very small hairs, but no spines. *Mesothorax* smallest segment of body excepting the last two of the abdomen, with *metathorax* only a little larger, and together they are wider, although not so large, as the prothorax. They bear no conspicuous hairs or spines. *No wings* or wing-pads are present. All *legs* are medium stout, unarmed, and with only a few inconspicuous hairs; color yellow, tarsi tipped with brown.

Abdomen brown, shading darker toward the tip; broadly oval; segments 1 to 4 increasing in size gradually; segments 4, 5, and 6 about equal, segment 7 tapering, 8 abruptly tapering to meet the very small ninth and conical tenth. Entire upper surface of abdomen reticulate.



THYSANOPTERA OF CALIFORNIA.

Fig. 1.—*Orothrips kelloggii*, head and prothorax of female. Fig. 2.—*Orothrips kelloggii*, left antenna of female. Fig. 3.—*Orothrips kelloggii*, right fore wing of female. Fig. 4.—*Orothrips kelloggii*, fore tarsus of female. Fig. 5.—*Æolothrips kuwanaii*, head and prothorax of female. Fig. 6.—*Æolothrips kuwanaii*, right antenna of female. Fig. 7.—*Æolothrips kuwanaii*, right fore wing of female. Fig. 8.—*Æolothrips kuwanaii*, fore tarsus of female. Fig. 9.—*Sericothrips reticulatus*, head, prothorax, and mesothorax of female. Fig. 10.—*Sericothrips reticulatus*, end of abdomen of female.

Segments 1 to 8 have each several very small hairs, segments 9 and 10 each with six or eight quite long, conspicuous spines.

Described from one female.

Food plant: Grass.

Habitat: Campus of the Leland Stanford Junior University, California.

This species has many characters in common with the *Prosopothrips vejdovskyi* described by Uzel.[a]

(6) **Sericothrips stanfordii**, new species. (Pl. II, fig. 11.)

Measurements: Head, length 0.12 mm., width 0.16 mm.; prothorax, length 0.13 mm., width 0.21 mm.; width of abdomen 0.36 mm; total body, length 1.25 mm. Antennæ: 1; 21μ; 2, 36μ; 3, 36μ; 4, 39μ; 5, 33μ; 6, 48μ; 7, 9μ; 8, 15μ; total, 0.24 mm. *Color* brown, tips of tibiæ yellow, tarsi yellow, with brown tips.

Head rounded in front, cheeks almost straight, roughened; surface of head cross-striate almost to a reticulation; a spine just inward from and two or three posterior to each eye; none, however, are prominent. *Eyes* medium, with light-colored inner and outer borders; slightly pilose, not protruding. *Ocelli* absent. *Mouth-cone* broad at base, blunt and dark-brown at tip; maxillary palpi three-segmented. *Antennæ* eight-segmented; twice as long as head; brown, segment 3 light brown.

Prothorax bears no prominent spines and but few short inconspicuous hairs; sides slightly arched; surface faintly cross-striate. *Mesothorax* and *metathorax* resemble abdominal segments; the mesothorax is the smaller; they bear no conspicuous spines or hairs; cross-striate on upper surface. Color uniform brown with rest of body. *No wings* are present. *Legs* medium stout, third pair armed with spines; tips of tibiæ yellow, tarsi yellow, each with a conspicuous brown spot at tip.

Abdomen dark brown, with light-colored bands on posterior edges of all segments excepting last two; these bands have small longitudinal, wavy thickenings; intersegmental membrane light brown or yellow. Body elongate-ovate; third, fourth, and fifth segments largest, tapering gradually to tip (segments cross-striate, especially on their anterior parts). Segments 1 to 7 each with several regularly placed small hairs; on last three segments, and especially on the last two, these hairs become quite strong, prominent spines.

Described from four females.

Food plant: Grass.

Habitat: Campus of the Leland Stanford Junior University, California.

4. Genus HELIOTHRIPS Haliday.

(7) **Heliothrips hæmorrhoidalis** Bouché and (8) **H. fasciatus** Pergande.

For descriptions of these two species see Hinds's Monograph of the Thysanoptera of North America, pages 168 and 174, respectively.

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[a] Monographie der Ordnung Thysanoptera, page 166.

Heliothrips hæmorrhoidalis is one of the commonest thrips in greenhouses, where it feeds on azaleas, ferns, and dahlias; out of doors it feeds and becomes very destructive on laurestinas.

Heliothrips fasciatus (Pl. II, figs. 12–14) has been taken from oranges in Colusa County by Mr. E. K. Carnes, from pea vines in Santa Rosa by Mr. O. E. Bremner, and the writer has taken it from wild vetch sweepings in the Santa Cruz Mountains, Santa Clara County, Cal.

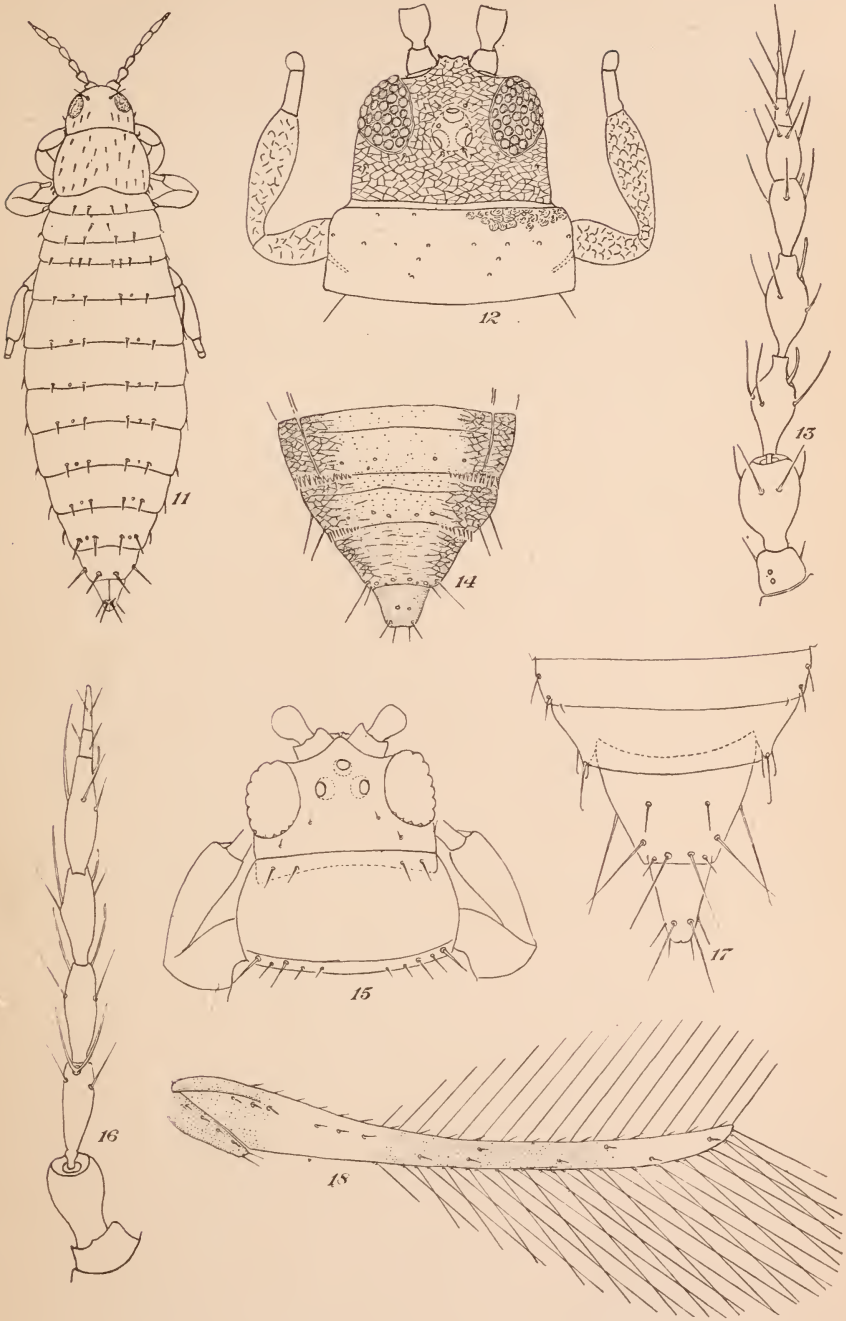
5. Genus EUTHRIPS Targione-Tozzetti.

Ocelli usually present, but sometimes more or less rudimentary. Antennæ eight-segmented. Maxillary palpi three-segmented. Prothorax as long or somewhat longer than head, with two long spines on each hind angle and one similar spine on each anterior angle in many species, but this is wanting in others. Legs usually unarmed, but in a few species with a stout tooth on the under side of fore tibia at end. Wings usually fully developed, but sometimes reduced; when present they are moderately broad, and in those species which have a spine at the fore angle of the pronotum both longitudinal veins are closely and regularly set with spines for their entire length. Spines on the abdomen are moderately stout, anal spines are long and slender. These species are usually active and most of them have the power of springing.

(9) **Euthrips orchidii**, new species. (Pl. II, figs. 15–18.)

Measurements: Head, length 0.10 mm., width 0.15 mm.; prothorax, length 0.10 mm., width 0.18 mm.; mesothorax, width 0.22 mm.; abdomen, width 0.25 mm.; total body, length 0.88 mm. Antennæ: 1, 18μ; 2, 30μ; 3, 48μ; 4, 48μ; 5, 48μ; 6, 54μ; 7, 12μ; 8, 21μ; total, 0.28 mm. *Color* yellow, head and all legs light lemon-yellow, wings light brown.

Head one-third wider than long, retracted into prothorax, angular in front, with concave depressions receiving basal joints of antennæ; spines inconspicuous; cheeks almost straight; head broadest across eyes. *Eyes* relatively large, occupying about one-half the length of the head, prominent; pigment granular and from deep red to purple; facets of eye as large as ocelli, eyes pilose. *Ocelli* subapproximate, margined inwardly with orange-red crescents. *Mouth-cone* short, reaching hardly beyond posterior margin of head, pointed and with a brown spot at tip; maxillary palpi three-segmented. *Antennæ* eight-segmented, light lemon-yellow, with tips of segments 4, 5, and 6 shading to light brown; segments 3, 4, and 5 of about the same length, segment 6 longest; forked sense cones on segments 3 and 4 long and slender, a short and a long simple sense cone near tip of segment 5, a similar pair on 6; on this latter segment the inner long cone is very long and reaches almost to tip of antennæ. All spines and sense cones are pale and inconspicuous.



THYSANOPTERA OF CALIFORNIA.

Fig. 11.—*Sericothrips stanfordii*, female. Fig. 12.—*Heliothrips fasciatus*, head and prothorax of female. Fig. 13.—*Heliothrips fasciatus*, right antenna of female. Fig. 14.—*Heliothrips fasciatus*, end of abdomen of female. Fig. 15.—*Euthrips orchidii*, head and prothorax of female. Fig. 16.—*Euthrips orchidii*, right antenna of female. Fig. 17.—*Euthrips orchidii*, end of abdomen of female. Fig. 18.—*Euthrips orchidii*, right fore wing of female.

Prothorax almost twice as wide as long, all angles broadly and evenly rounded; a prominent line across the posterior part which might easily be mistaken for the hind margin; with two short and quite stout spines on each posterior angle; all spines light colored and not readily seen. *Mesothorax* largest, sides of *metathorax* almost parallel and very slightly arched. *Legs* uniform light yellow; all tibiæ with a spine at tip, hind tibiæ with a row of regularly placed spines on upper inner side; all tarsi with a brown spot at tip. *Wings* present and fully developed; fore wings light brown, with two white areas, one near base and one at tip. A single rudimentary vein at base of each fore wing; spines of wing few and scattered, except two groups of three each near base and five on scale; wing broadest at base, anterior margin bowed, posterior margin straight from base to near tip, where it curves forward to form a scythe-like tip; both anterior and posterior fringes long and sparse.

Abdomen ovoid, tip conical, segments 9 and 10 drawn out, and spines on these last two are long and prominent.

Described from four females.

Specimens collected from orchids in greenhouse, Fruitvale, Alameda County, Cal., by Mr. O. E. Bremner.

(10) **Euthrips pyri** Daniel. (Pl. III, figs. 19–24.)

Measurements: Head, length 0.13 mm., width 0.15 mm.; prothorax, length 0.13 mm., width 0.2 mm.; mesothorax, width 0.28 mm.; abdomen, width 0.31 mm.; total length 1.26 mm. Antennæ: 1, 33μ; 2, 45μ; 3, 63μ; 4, 54μ; 5, 33μ; 6, 66μ; 7, 9μ; 8, 12μ; total, 0.31 mm. *Color* dark brown, tarsi light brown to yellow.

Head slightly wider than long, cheeks arched, anterior margin angular, back of head transversely striate and bearing a few minute spines and a pair of very long prominent spines between posterior ocelli. *Eyes* prominent, oval in outline, black with light borders, coarsely faceted and pilose. *Ocelli* are approximate, yellow, margined inwardly with orange-brown crescents, posterior ones approximate to but not contiguous with light inner borders of eyes. *Mouth-cone* pointed, tipped with black; maxillary palpi three-segmented; labial palpi two-segmented, basal segment very short. *Antennæ* eight-segmented, about two and one-half times as long as head, uniform brown except segment 3, which is light brown; spines pale; a forked sense cone on dorsal side of segment 3, with a similar one on ventral side of segment 4.

Prothorax about as long but wider than head; a weak spine at each anterior and two large, strong ones on each posterior angle; other spines are not conspicuous. *Mesothorax* with sides evenly convex, angles rounded; metanotal plate with four spines near front edge, inner pair largest. The mesonotal and metanotal plates are faintly striate.

Legs moderately long, uniform brown except tibiæ and tarsi, which are yellow. Spines on tip of fore and middle tibiæ weak; several strong spines on hind tibiæ. *Wings* present, extending beyond tip of abdomen, about twelve times as long as wide, pointed at tips; costa of fore wings thickly set with from twenty-nine to thirty-three quite long spines; fore vein with twelve or fifteen arranged in two groups of three and six respectively on basal half of wing and a few scattering ones on distal part; hind vein with fifteen or sixteen regularly placed spines; costal fringe on fore wing about twice as long as costal spines.

Abdomen subovate, tapering abruptly toward the tip from the eighth segment; longest spines on segments 9 and 10; abdomen uniform brown, connective tissue yellow.

Redescribed from many specimens, including several cotypes from Miss Daniel.

Male unknown.

Food plants: Apricots, apples, almonds, cherries, figs, grapes, pears, prunes, plums, walnuts. The insect is found mostly on deciduous fruits.

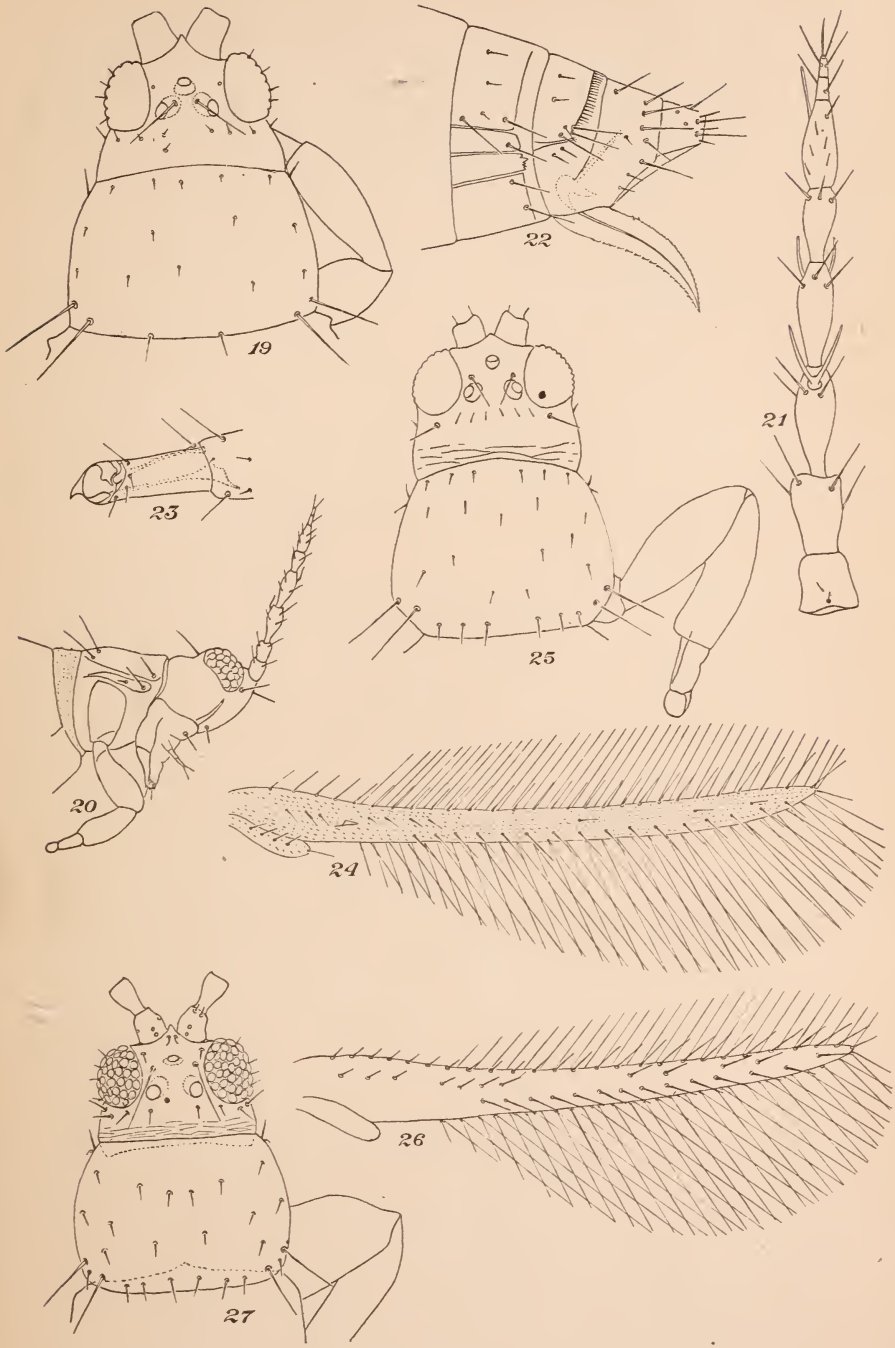
Habitat: San Francisco Bay region, California.

(11) **Euthrips ehrhornii**, new species. (Pl. III, figs. 25, 26.)

Measurements: Head, length 0.11 mm., width 0.13 mm.; prothorax, length 0.14 mm., width 0.18 mm.; mesothorax, width 0.23 mm.; abdomen, width 0.29 mm.; total body length 1.2 mm. Antennæ: 1, 24μ; 2, 39μ; 3, 48μ; 4, 45μ; 5, 36μ; 6, 54μ; 7, 6μ; 8, 9μ; total, 0.26 mm. General *color* brown, head light brown, thorax a little darker, abdomen brown to dark brown.

Head slightly longer than wide; front of head angular, and with concave depressions to receive basal segments of antennæ; cheeks roughened; posterior part of head faintly cross striate. Spines between ocelli prominent; postocular spines present but small. *Eyes* large, oval, slightly protruding, with an emargination on the side of the head between cheek and eye; pigment purple. *Ocelli* separated, margined inwardly with orange-red crescents. *Mouth cone* long and pointed; maxillary palpi three-segmented. *Antennæ* subapproximate; uniform brown except segment 1, basal half of 3, and tip of 4, which are gray-brown.

Prothorax widest across posterior part; all angles rounded. Two large spines on each posterior angle with several smaller ones along posterior margin; of these latter the inner ones are the larger; large spines on posterior angles are dark brown; no conspicuous spines on anterior angles. Sides of both *mesothorax* and *metathorax* slightly arched; pterthorax may be of a darker shade of brown than prothorax. *Legs* uniform brown, except all trochanters, which are white, and tibiæ,



THYSANOPTERA OF CALIFORNIA.

Fig. 19.—*Euthrips pyri*, head and prothorax of female. Fig. 20.—*Euthrips pyri*, head and prothorax of female from side. Fig. 21.—*Euthrips pyri*, right antenna of female. Fig. 22.—*Euthrips pyri*, end of abdomen of female from side. Fig. 23.—*Euthrips pyri*, fore tarsus of female. Fig. 24.—*Euthrips pyri*, right fore wing of female. Fig. 25.—*Euthrips ehrhornii*, head and prothorax of female. Fig. 26.—*Euthrips ehrhornii*, right fore wing of female. Fig. 27.—*Euthrips ulicis californicus*, head and prothorax of female.

which are light brown; each hind tibia armed at tip with a spine; all tarsi with a brown spot at tip. *Wings* fully developed, uniform light gray-brown, all veins weak. Fore margin and hind vein set regularly with conspicuous dark brown spines, about twenty-six on fore margin and thirteen on hind vein; fore vein with twelve spines arranged in two groups of three and four on basal half of wing and five scattered spines on distal half.

Abdomen elongate-ovate, pointed at tip. Spines at sides increasing in prominence toward tip, those on 9 and 10 largest and most conspicuous of any on body. Hairs in comb-like structure on posterior margin of segment 8 closely placed.

Described from two females.

Food plant: Grass.

Habitat: Alum Rock Canyon, Santa Clara County, Cal.

This species is very close to *Euthrips pyri*.

(12) **Euthrips ulicis californicus.** new variety. (Pl. III, fig. 27; Pl. IV, figs. 28–31.)

Measurements: Head, length 0.13 mm., width 0.17 mm.; prothorax, length 0.21 mm., width 0.25 mm.; mesothorax, width 0.36 mm.; abdomen, width 0.40 mm.; total body, length 1.33 mm. Antennæ: 1, 30μ; 2, 45μ; 3, 75μ; 4, 66μ; 5, 48μ; 6, 66μ; 7, 15μ; 8, 18μ; total, 0.36 mm. *Color* dark-brown, except tarsi and fore tibiæ, which are light brown or yellow.

Head slightly wider than long, deeply set in prothorax; cheeks straight, parallel; front of head broad and quite straight, having only a small elevation between bases of antennæ; head noticeably square in front; back of head transversely striate; large spine on back of head just inward from each eye and anterior to each posterior ocellus; a pair of small backwardly curved spines on apex of head; four or five spines posterior to each eye, the outer one of each group being prominent on the side of the cheek. *Eyes* medium, prominent, but not protruding; pilose; with light inner borders, pigment deep red to black. *Ocelli* large, separated, orange colored, with orange brown crescents, posterior ones almost contiguous with light borders around eyes. *Mouth cone* pointed, maxillary palpi three-segmented. *Antennæ* eight-segmented, about two and one-half times as long as head; brown, unicolorous with body except segment 3, which is yellow, and 4, which is light brown; forked sense cones are found on segments 3 and 4 and a pointed sense scale set in a transparent area near tip of segment 6. Segments 3 and 4 constricted near their tips.

Prothorax noticeably larger than head, sides convex; a short spine on each anterior angle and two long prominent spines on each posterior angle. *Mesothorax* largest, anterior angles broadly rounded, posterior ones slightly constricted to meet the smaller metathorax. Sides of *metathorax* almost straight and parallel posterior angles

rounded. *Legs* brown, concolorous with body except fore tibiæ, which are yellow, shading to brown on sides, fore tarsi, which are yellow, and other tarsi which are yellow to light brown. Fore femora thickened. Fore tarsi armed each with a stout tooth, and near this is a protuberance on which is set a sharp spine. *Wings* present; fore wings brown, except basal fourth, which is white; costa and both longitudinal veins set with long, conspicuous brown spines, twenty-six on costa, twenty on fore vein, sixteen on hind vein, five on scale.

Abdomen ovate; third to sixth segments largest and about equal; the seventh to tenth tapering gradually to form the conical tip. A few quite prominent spines along sides of abdomen, but long and slender ones only on segments 9 and 10, a circlet of eight on segment 9 and six on segment 10.

Males smaller than females; antennæ, legs, and wings with similarly placed spines; fore femora thickened, fore tibiæ armed with teeth. Tip of abdomen with prominent spines, penis upturned; antennæ with segments 1 and 5 to 8 brown, and 2, 3, and 4 yellow.

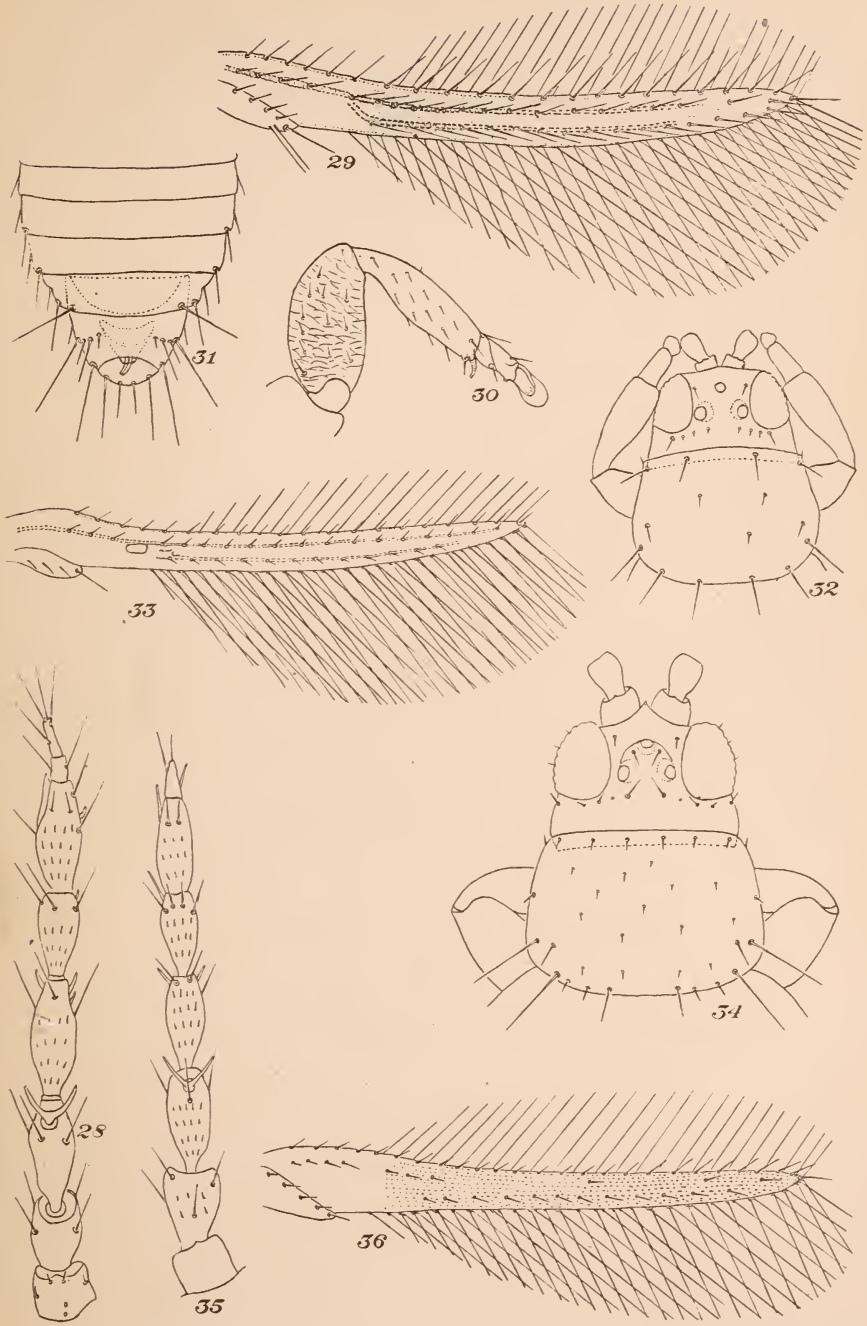
Described from three females and four males, specimens taken from vetch sweepings near Wrights Station, Santa Clara County, Cal.

The species here described corresponds in almost every respect to the *Physopus ulicis* Haliday, as described by Uzel in his Monographie der Ordnung Thysanoptera, page 115. The genus name *Physopus* has since been changed to *Euthrips* by Hinds in his Monograph of the Thysanoptera of North America. I therefore have called this species *Euthrips ulicis californicus*. The *Physopus ulicis* of Uzel is recorded as found in England (Haliday), in Finland (Reuter), and in Bohemia (Uzel).

(13) **Euthrips minutus**, new species. (Pl. IV, figs. 32, 33.)

Measurements: Head, length 0.096 mm., width 0.14 mm.; prothorax, length 0.105 mm., width 0.17 mm.; mesothorax, width 0.21 mm.; abdomen, width 0.24 mm.; total body, length 0.83 mm. Antennæ: 1, 21μ; 2, 30μ; 3, 39μ; 4, 36μ; 5, 30μ; 6, 42μ; 7, 9μ; 8, 12μ; total, 0.21 mm. *Color* uniform dark brown, wings gray-brown.

Head about one and one-half times as wide as long, retracted into thorax; anterior margin of head almost straight, being but slightly and smoothly elevated in front; cheeks straight, diverging posteriorly; no conspicuous markings on head. A weak spine close in front of each posterior ocellus and one behind each eye; other spines very inconspicuous. *Eyes* moderately large, not protruding, pigment of a deep red. *Ocelli* widely separated, posterior ones contiguous with light inner margins of eyes; considerably larger than facets of eyes; orange-yellow; margined inwardly with large orange crescents. *Mouth-cone* short; maxillary palpi three-segmented. *Antennæ* inserted a little below the margin, slightly more than twice as long as head, quite uniform brown.



THYSANOPTERA OF CALIFORNIA.

Fig. 28.—*Euthrips ulicis californicus*, left antenna of female. Fig. 29.—*Euthrips ulicis californicus*, right fore wing of female. Fig. 30.—*Euthrips ulicis californicus*, fore leg of female. Fig. 31.—*Euthrips ulicis californicus*, end of abdomen of male. Fig. 32.—*Euthrips minutus*, head and prothorax of female. Fig. 33.—*Euthrips minutus*, right fore wing of female. Fig. 34.—*Thrips madronii*, head and prothorax of female. Fig. 35.—*Thrips madronii*, right antenna of female. Fig. 36.—*Thrips madronii*, right fore wing of female.

Prothorax noticeably larger than head, without conspicuous markings; anterior angles straight, posterior broadly rounded. A large spine on each anterior angle and a second on anterior margin on either side about half way between the first spine and the median line; three large spines on posterior margin on either side about equidistant apart, the outer one being the conspicuous spine on the posterior angle; other spines extremely small. *Mesothorax* widest, sides arched, evenly united with metathorax; sides of *metathorax* almost straight, but widening toward the abdomen. Thorax slightly orange colored. *Legs* medium, brown, except fore tibiæ and all tarsi, which are light brown. Hind tibiæ and tarsi armed each with a sharp spine. *Wings* present, reaching to tip of abdomen; gray-brown, each with a small, white, transparent area about one-fifth the wing's length from its base. Two longitudinal veins, fore vein extending from base to near tip, hind vein appears close after the white area and fades before the end. Fore margin of wing and longitudinal veins set regularly with short, sharp-pointed brown spines, twenty-three on fore margin, eighteen on fore vein, twelve on hind vein.

Abdomen with prominent spines only on last few segments; a weak comb-like arrangement of spines on the posterior margin of segment 8.

Described from one female.

Food plant: Grass.

Habitat: Berkeley, Cal.

(14) **Euthrips occidentalis** Pergande, and (15) **Euthrips tritici** Fitch.

For descriptions of these species see Hinds's Monograph of the Thysanoptera of North America, pages 152 and 148, respectively.[a]

6. Genus PARTHENOTHRIPS Uzel.

(16) **Parthenothrips dracænæ** Heeger.

For description see Hinds's Monograph, page 176. Specimens taken from dracæna in greenhouse in San Francisco, by Mr. E. M. Ehrhorn.

7. Genus THRIPS Linnæus.

(17) **Thrips madronii**, new species. (Pl. IV, figs. 34–36.)

Measurements: Head, length 0.11 mm., width 0.15 mm.; prothorax, length 0.13 mm., width 0.20 mm.; mesothorax, width 0.33 mm.; abdomen, width 0.33 mm.; total body, length 1.25 mm. Antennæ: 1, 27μ; 2, 39μ; 3, 60μ; 4, 54μ; 5, 45μ; 6, 54μ; 7, 21μ; total, 0.3 mm. *Color*

[a] The writer has taken specimens of these two species of *Euthrips* (*occidentalis* and *tritici*) from the most of our wild and cultivated flowers. They are commonly found together. The variations in size, color, and in the relative lengths of segments of the antennæ (in each of the two species) are so great that the writer has been unable to draw a sharp line of distinction between them.

uniform brown, usually dark brown; wings gray-brown, lighter at base; tibiæ and tarsi sometimes light brown.

Head almost as long as wide, front of head angular, basal segments of antennæ set in concave depressions in front of head; cheeks arched, sides roughened; posterior part of head cross-striate. No prominent spines on head, although there is a row of small spines on each side immediately back of the eyes, the inner ones of which are the larger. *Eyes* prominent, slightly protruding, pilose, margined inwardly with light borders; pigment black. *Ocelli* subapproximate, separated from inner margin of eyes; light orange colored and margined inwardly with deep orange-red crescents; usually with circular thickening connecting anterior ocellus with outside of posterior ones, and included within this, on either side of the anterior ocellus, is a small spine. *Mouth cone* long, pointed; maxillary palpi three-segmented; labial palpi two-segmented, first very short, second very long and slender. *Antennæ* with all segments of uniform width and color, except 2, which is somewhat wider and a little darker brown; sometimes segment 3 is also a little lighter brown.

Prothoraæ about as long as head but somewhat wider; all angles rounded; a pair of prominent spines on each posterior angle, with a smaller pair on posterior margin near center; sometimes a third quite prominent spine is present near larger ones on posterior angles. *Mesothoraæ* largest; *metathoraæ* smaller with sides almost straight, hind angles rounded. All segments uniform brown. *Legs* medium, concolorous with body; hind tibiæ armed with several stout spines. *Wings* fully developed, noticeably broader at base and gradually narrowing toward the tip, light brown, except basal one-fourth, which is light gray-brown. Costal and longitudinal veins prominent only on basal half of wing; costa with about twenty-six regularly placed spines; fore longitudinal vein with two groups on basal half, first group of four and second of three; three other spines on distal half; hind vein with twelve regularly placed spines.

Abdomen uniform dark-brown, with a darker brown line across anterior margins of segments 2 to 7; connective tissue brown; stout spines on sides of all segments, these becoming longer near the tip with the longest on segments 9 and 10. Comb-like arrangement of spines on posterior margin of segment 8.

Males much smaller than females and with large light-colored oval areas on ventral sides of segments 3 to 6.

Described from twenty-one females and three males.

Food plants: Blossoms of madroña, California laurel, and California lilac.

Habitat: Santa Clara Valley, California.

This species in a general way resembles *Euthrips pyri*, and either one at a casual glance could be easily mistaken for the other.

(18) **Thrips tabaci** Lindeman.

For description see Hinds's Monograph, page 179.

Thrips tabaci is common everywhere in wild and cultivated flowers, but its principal food plant is the onion. It has been very destructive on several large seed farms where onions are grown for seed purposes. It is commonly known as the onion thrips.

(19) **Thrips bremnerii**, new species. (Pl. V, figs. 37–39.)

Measurements: Head, length 0.1 mm., width 0.10 mm.; prothorax, length 0.12 mm., width 0.14 mm.; mesothorax, width 0.18 mm.; abdomen, width 0.21 mm.; total body, length 1.08 mm. Antennæ: 1, 21μ; 2, 33μ; 3, 42μ; 4, 36μ; 5, 33μ; 6, 39μ; 7, 15μ; total, 0.21 mm. *Color* uniform light lemon-yellow, shading to light brown; abdominal segments often shaded brown on dorsal side. Body long and slender.

Head about as long as wide, angular in front, basal segments of antennæ received in concave depressions on upper front side, back of head faintly cross-striate; cheeks arched but little. A spine on either side of anterior ocellus and one immediately behind each posterior ocellus, the spines light, concolorous with head and not conspicuous. *Eyes* prominent, protruding, pilose, black or deep purple by transmitted light, red by reflected light. *Ocelli* subapproximate, very light and margined inwardly with light-brown crescents. *Mouth cone* shading dark brown toward the end and tipped with black; maxillary palpi three-segmented, labial palpi two-segmented, terminal one very long. *Antennæ* quite uniform light brown, basal segment often lighter or second segment darker.

Prothorax but little larger than the head; all angles rounded, and if the body is distended, together with the light colored intersegmental membrane, the prothorax is quite round; two large brown spines on each posterior angle, with a row of three on each side along the hind margin, the inner one being the larger. *Pterthorax* somewhat darker than prothorax; sides of mesothorax rounded, sides of metathorax narrowed in front, forming a quite noticeable concave depression on either side. *Legs* medium, concolorous with or somewhat lighter than body, hind tibiæ alone armed with spines, a dark-brown spot on the tip of each tarsus. *Wings* fully developed, though not reaching to tip of abdomen, broad at base; uniform white with brown spines. Veins are either very rudimentary or, as in some specimens, highly developed. In these latter the two longitudinal veins may be seen extending to and joining the margin on either side of the tip; also there are two cross veins, one at about one-third, and a second at about two-thirds the wing's length from the base; they connect costa and fore longitudinal vein. Costa with twenty-five spines; fore vein with twelve, arranged as follows: Two groups of four and three, respectively, on basal half of wing, and five others regularly placed on distal half; twelve on hind vein.

Abdomen long and slender; segments 3 to 8 with a brown line near anterior margin; spines on last segments not noticeably long.

Described from twenty-five females.

Food plant: Figs. Specimens taken from the inside of ripe figs.

Habitat: Santa Clara Valley, California.

Family PHLŒOTHRIPIDÆ.

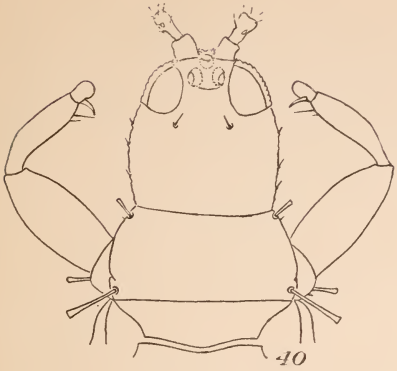
8. Genus TRICHOTHRIPS Uzel.

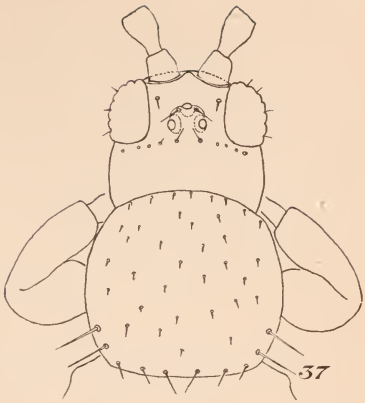
(20) **Trichothrips dens**, new species. (Pl. V, figs. 40–43.)

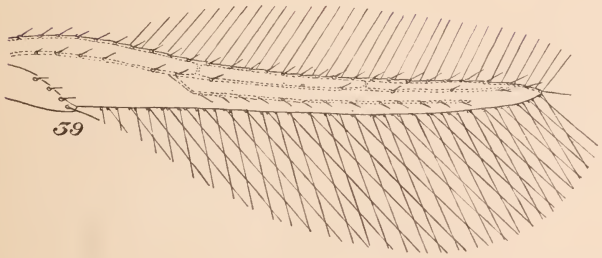
Measurements: Head, length 0.26 mm.; width 0.25 mm.; prothorax, length 0.15 mm., width 0.31 mm.; mesothorax, width 0.35 mm., abdomen, width 0.40 mm.; tube, length 0.17 mm.; total body, length 1.5 mm. Antennæ: 1, 30μ; 2, 60μ; 3, 90μ; 4, 78μ 5, 54μ; 6, 54μ; 7, 48μ; 8, 24μ; total, 0.44 mm. *Color* brown, with conspicuous red pigment blotches on body and legs.

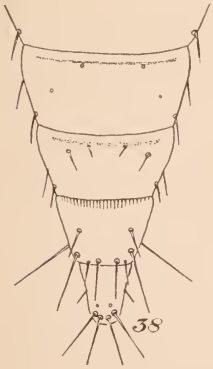
Head about as long as wide, broadly rounded in front; frons elevated only slightly between basal segments of antennæ. Cheeks arched, converging posteriorly; with edges roughened; bearing a few short, stout spines which are raised on small tubercles. Red pigment on head is conspicuous. A pair of short, inconspicuous, postocular spines are present. *Eyes* large, with small facets, black by transmitted light, with light inner borders and light lemon-yellow, transparent outer borders; not pilose. *Ocelli* present, subapproximate, margined inwardly with dark crescents, anterior one on apex of head. *Mouth cone* pointed, reaching beyond posterior margin of prothorax. *Antennæ* eight-segmented, one and two-thirds times as long as head; brown, unicolorous with body, except that the base and tip of segment 3 and bases of segments 4 and 5 shade to light brown or lemon-yellow. Segment 1 truncate; 2 constricted at base into a broad stalk and fitting ball-and-socket-like into a depression in segment 1; 3 to 6 inclusive each with a slender stalk at base, each also somewhat constricted at the distal end; 7 cylindrical-ovate and very closely and evenly united with 8, which is conical. A dark spot on segment 2 is probably a sense area; segments 3 to 6 inclusive each with three simple sense cones, with one cone on segments 5 and 6 rudimentary; 7 and 8 bear each a simple sense cone and a fringe of eight or nine sense hairs on their inner margin.

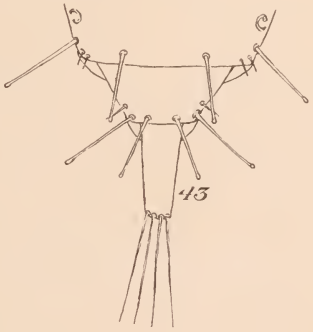
Prothorax about half as long as head but wider than head is long. It bears no hairs other than a single, stout, transparent, knobbed pair on the hind angles and a similar smaller pair on the anterior angles. *Mesothorax* and *metathorax* about equal in width and slightly wider than prothorax; with sides almost parallel; they bear no conspicuous spines or hairs. Each *fore coxa* projects considerably beyond margin at sides of prothorax and forms what appears to be the prominent angle; each bears a short, stout, transparent, knobbed hair on prominent angle.

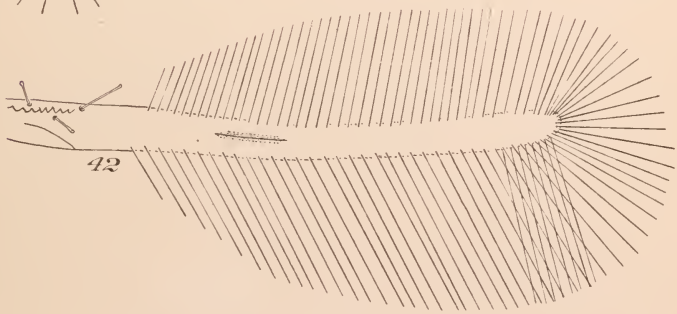












THYSANOPTERA OF CALIFORNIA.

Fig. 37.—*Thrips bremnerii*, head and prothorax of female. Fig. 38.—*Thrips bremnerii*, end of abdomen of female. Fig. 39.—*Thrips bremnerii*, right fore wing of female. Fig. 40.—*Trichothrips dens*, head and prothorax of female. Fig. 41.—*Trichothrips dens*, left antenna of female. Fig. 42.—*Trichothrips dens*, right fore wing of female. Fig. 43.—*Trichothrips dens*, end of abdomen of female. Fig. 44.—*Trichothrips femoralis*, right antenna of female.

Fore femora enlarged; fore tarsi stout and each armed with a stout tooth. Other than a single row of stout spines on the hind tibiæ, the legs bear no conspicuous spines and only a few small hairs. *Wings* reach to base of tube; both pairs equal; edges parallel; with simple fringe of long, straight hairs on both margins. Fore wings double fringed on posterior margin near tip by seven or eight hairs. Membrane of wings transparent, shaded gray-brown near base. Fore wings each with a single median rudimentary vein and center of wing along vein shaded light brown. Base of wing bears three knobbed hairs, one long and two short ones; costal margin near base with wavy thickenings.

Abdomen about as wide as thorax, last three segments tapering abruptly; tube slender and about two-thirds as long as head; terminal hairs as long as tube. The abdomen is brown and red, unicolorous with the thorax and head. Each posterior angle of all segments except the first bears a stout, transparent, knobbed hair, these increasing in length from the second to and including the ninth. Other smaller hairs are also found on the prominent angles.

Described from one female; male unknown.

Food plant: Apricot.

Habitat: Santa Clara Valley, California.

(21) **Trichothrips femoralis**, new species. (Pl. V, fig. 44; Pl. VI, figs. 45, 46.)

Measurements: Head, length 0.21 mm., width 19 mm., prothorax, length 0.20 mm., width 0.33 mm. (including coxa); mesothorax width 0.38 mm.; abdomen, width 0.40 mm.; tube, length 0.16 mm.; total body, length 1.7 mm. Antennæ: 1, 33μ; 2, 48μ; 3, 66μ; 4, 66μ; 5, 66μ; 6, 63μ; 7, 63μ; 8, 48μ; total, 0.52 mm. *Color* uniform dark-brown, except fore tibiæ and tarsi and segments of antennæ, 3 to 6 inclusive, which are yellow; middle and hind tarsi light brown. Orange-colored pigment may be seen in lighter colored specimens.

Head slightly longer than wide, rounded in front; frons elevated between basal segments of antennæ; cheeks almost straight and parallel; margins roughened; back of head with cross striations. Postocular spines prominent; other small spines not conspicuous. *Eyes* occupying about one-third the length of the head, with small facets, not pilose; with light, irregular, orange-tinted inner borders and light lemon-yellow narrower outer borders. *Ocelli* present, anterior one on apex of head, posterior ones orange-tinted and contiguous, with light inner borders of eyes. *Mouth cone* small, no longer than width at base, tip bluntly pointed; rudimentary chitinous thickening on either side about halfway between base of cone and eyes, equally well developed on both sides. *Antennæ* eight-segmented, slightly more than twice as long as head; basal segment brown; 2 brown, shading to

yellow; 3 to 6 inclusive are yellow, with 5 and 6 shading to gray-brown at tips; 7 and 8 brown. Dark-brown area on inner margin of segment 2 probably a sense area; simple sense cones on segments 3 to 8.

Prothorax almost as long as head and about one-third wider than long; it bears ten prominent spines, a pair on anterior margin, one on each anterior angle, one midway on each side, and two on each posterior angle. Sides of *mesothorax* almost parallel and united evenly with the sides of the metathorax, which latter converge posteriorly. The *fore coxæ* are protruding and form what appear to be the prominent sides of the prothorax; each is tipped with a long spine. Fore femora enlarged; fore tarsi each armed with a very small tooth. *Wings* reaching nearly to base of tube, both pairs similar, clear white, with a long simple fringe on both anterior and posterior margins.

Abdomen about equal or slightly wider than the mesothorax; segments 2 to 7 inclusive taper uniformly, with hind angles prominent. Abdomen uniform brown with the thorax and head; red pigment conspicuous. Segments 1 to 7 each with two long spines on each side near posterior margin, the outer ones in each case appearing as the spine on the outer prominent angle; the spines approach each other and the margin on segments 7, 8, and 9 to form a pair on the prominent angles. Segments 1 to 7 have each two pairs of strong, incurved spines at about one-fourth the width of the abdomen from the margin and in each case the hinder pair is the stouter; these spines function in holding the wings when at rest. Tip of tube bears six long spines about as long as the tube itself, and several shorter ones. Scales present on last segments of females.

Males are similar to females in most respects, but possess the very greatly enlarged fore femora and do not have scales on the last abdominal segments.

Described from one female and two males.

Food plant: Wild mullein.

Habitat: Newcastle, Cal.

(22) **Trichothrips ilex**, new species. (Pl. VI, figs. 47–49.)

Measurements: Head, length 0.21 mm., width 0.20 mm.; prothorax, length 0.13 mm., width, including coxa, 0.32 mm.; mesothorax, width 0.38 mm.; abdomen, width 0.50 mm., length of tube 0.16 mm.; total length of body 1.70 mm. Antennæ: 1, 30μ; 2, 51μ; 3, 60μ; 4, 60μ; 5, 60μ; 6, 54μ; 7, 54μ; 8, 30μ; total, 0.35 mm. *Color* very dark brown, almost black; all tarsi and tips of fore tibiæ and segments 3 and 4 of antennæ shading to yellow.

Head about as long as wide, broadly rounded in front, frons projecting between basal segments of antennæ; cheeks slightly convex, and with edges roughened, back of head with transverse striations. Postocular spines prominent. *Eyes* medium, with small facets, not

protruding, not pilose, with light-yellow outer margin and a light, irregular inner border. *Ocelli* present, granulated, anterior one on apex and posterior ones bordering inner margins of eyes. *Mouth cone* about as broad as long, reaching nearly to posterior margin of prosternum, pointed at tip; chitinous thickenings between base of mouth-cone and eyes very rudimentary and about equally well developed. Maxillary palpi two-segmented; basal segment very small, second segment long. Labial palpi two-segmented, basal segment shortest. *Antennæ* eight-segmented, about twice as long as head; color brown, except segment 3 and basal parts of segments 4, 5, and 6, which are yellow. Segment 2 with darkened sense area on dorsal surface; 3 to 7 have simple sense cones; 7 and 8 have a row of sense hairs.

Prothorax about twice as wide as long; it bears ten long spines, two on anterior margin, one on each anterior angle, one near middle of each side, and two at each posterior angle. Sides of *pterthorax* slightly convex, converging both anteriorly and posteriorly. Fore coxæ apparently immovably set and forming the outer angles of the prothorax; fore femora somewhat enlarged; all tarsi with a brown spot at tip and armed with a small tooth. *Wings* reaching nearly to tip of eighth segment, both pairs similar; first pair light brown, hind pair gray; each with a long, simple fringe on both margins; tip of fore wing double fringed behind by about twelve hairs; with three prominent spines at base and a wavy thickening near anterior margin at base; wings without veins.

Abdomen broadly ovate, segments 1 to 7 inclusive about equal; eighth tapering abruptly to meet the smaller ninth and very narrow tenth; segments with two long and several shorter spines on prominent angles, these spines increasing in length toward the tip. Segments 1 to 7 each with two pairs of inwardly curved spines about one-fourth the width of the abdomen from the margin; the posterior pair in each case is the larger. Tip of tube bears six long and several short hairs. Females with scales on last segments of abdomen.

Described from numerous specimens.

Male similar to female, but without scales on abdomen.

Food plant: Christmas berry (*Heteromeles arbutifolia*).

Habitat: Coast region of California.

(23) **Trichothrips ilex dumosa**, new variety.

The members of this variety are very similar to the species, differing only in minor details. The two insects are about equal in size; the head is somewhat longer in *T. ilex dumosa*, the antennæ are brown, with only the base of segment 3 yellow; all tarsi are gray-brown to brown. The food plant is the scrub oak, *Quercus dumosa*.

Habitat.—Saratoga, Santa Clara County, Cal.

9. Genus ACANTHOTHRIPS Uzel.

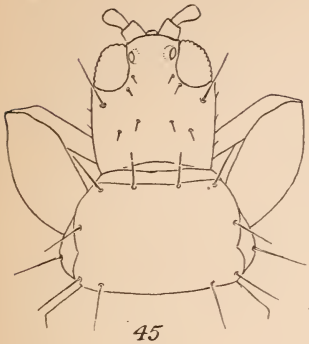
(24) **Acanthothrips doaneii**, new species (Pl. VI, figs. 50–52.)

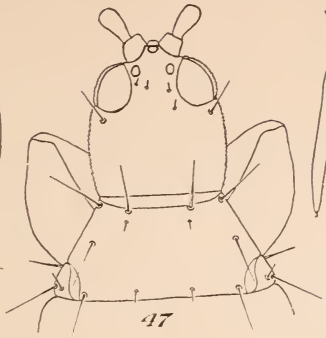
Measurements.—Head, length 0.37 mm., width 0.25 mm.; prothorax, length 0.20 mm., width, including protruding coxa, 0.45 mm.; mesothorax, width 0.50 mm.; abdomen, width 0.50 mm.; tube, length 0.28 mm.; total body, length 2.4 mm. Antennæ: 1, 48μ; 2, 69μ; 3, 126μ; 4, 120μ; 5, 114μ; 6, 81μ; 7, 78μ; 8, 45μ; total, 0.633 mm. *Color* very dark brown, except tips of tibiæ, tarsi, and basal and distal parts of segments 3 to 6, inclusive of antennæ, these parts shading to yellow.

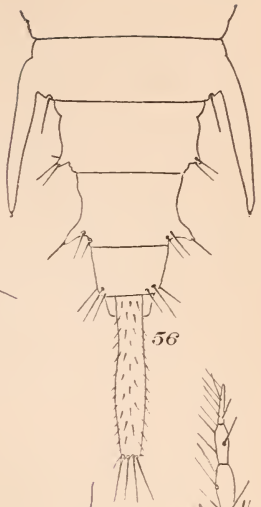
Head about one-third longer than wide; cheeks converging posteriorly; frons elevated between basal segments of antennæ; back of head with cross striations, roughened and set with small spines raised on conspicuous tubercles. *Eyes* large, slightly bean-shaped, not pilose, finely faceted, each with an orange-colored inner border and a light lemon-yellow, uniform outer border. *Ocelli* present, anterior one near apex of head, posterior ones contiguous with central concave portions of inner margins of eyes. *Mouth cone* pointed, reaching almost to posterior margin of prosternum. *Antennæ* eight-segmented, scarcely twice as long as head; segments 1, 2, 7, and 8 dark brown, 3 to 6 inclusive brown, shading light brown or yellow at either end; segment 1 cylindrical; 2 subclavate, 3 to 6 inclusive constricted to broad stalks at base, and constricted abruptly at their distal ends where they receive sense cones, two on segments 3 and 7, three (one rudimentary) on 5 and 6, four (two rudimentary) on segment 4.

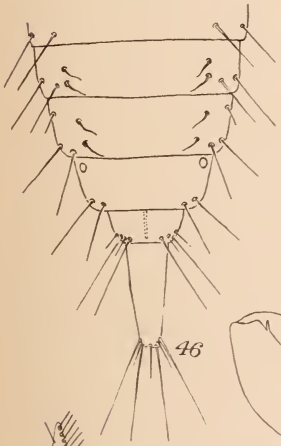
Prothorax about twice as wide as long, reticulate, bearing a single pair of short spines on anterior angles and a long pair of knobbed hairs on posterior angles; surface faintly covered with short inconspicuous hairs. *Mesothorax* with front margin almost straight, projecting beyond sides to form a short, rounded shelf where the segment is widest; sides almost parallel, constricted after the middle, posterior angles rounded. *Metathorax* with sides evenly convexed, roughened, and reticulate; mesonota and metanota also reticulate. *Fore coxæ* protruding beyond and not readily distinguished from sides of prothorax; fore femora greatly enlarged and armed on inner margin of distal part with a stout tooth, each fore tarsus also armed with a tooth; other legs long and slender. *Wings* fully developed, both pairs alike, with regular fringe of long, closely arranged hairs on either margin; a wavy thickening along anterior margin at base of fore wing, upon which stand one long and two short knobbed hairs; distal anal wing margin double fringed with about twenty-four hairs.

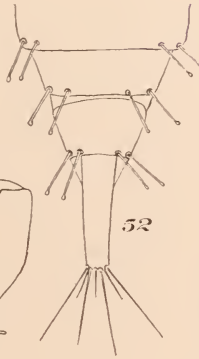
Abdomen about as wide as mesothorax and slightly wider than the metathorax. Sides of segments 1 to 5 almost equal and parallel, other segments tapering gradually to meet the tube; a pair of knobbed hairs on each prominent angle; tip of tube bears six long and several short hairs.

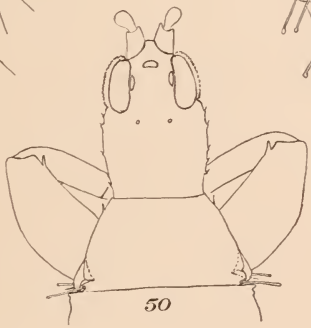


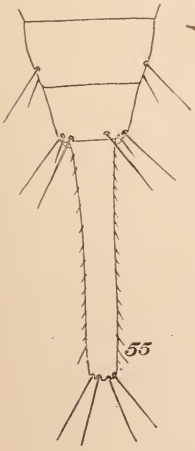


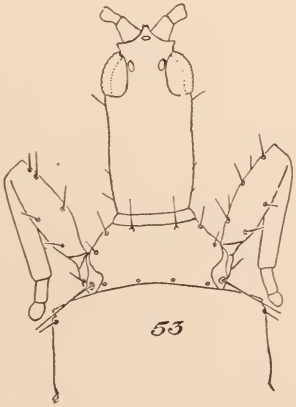












THYSANOPTERA OF CALIFORNIA

Fig. 45.—*Trichothrips femoralis*, head and prothorax of female. Fig. 46.—*Trichothrips femoralis*, end of abdomen of female. Fig. 47.—*Trichothrips ilex*, head and prothorax of female. Fig 48.—*Trichothrips ilex*, left antenna of female. Fig. 49.—*Trichothrips ilex*, base of right fore wing of female. Fig. 50.—*Acanthothrips doaneii*, head and prothorax of male. Fig. 51.—*Acanthothrips doaneii*, left antenna of male. Fig. 52.—*Acanthothrips doaneii*, end of abdomen of male. Fig. 53.—*Megalothrips hesperus*, head and prothorax of female. Fig. 54.—*Megalothrips hesperus*, right antenna of female. Fig. 55.—*Megalothrips hesperus*, end of abdomen of female. Fig. 56.—*Megalothrips hesperus*, end of abdomen of male.

Described from one male.
Food plant: Grass.
Habitat: Alum Rock Canyon, Cal.

10. Genus MEGALOTHRIPS Heeger.

(25) **Megalothrips hesperus**, new species. (Pl. VI, figs. 53–56.)

Measurements: Head, length 0.58 mm., width 0.26 mm.; prothorax, length 0.25 mm., width 0.46 mm.; metathorax, width 0.83 mm.; abdomen, width 1 mm.; tube, length 0.83 mm., width 0.11 mm.; total body, length 4.66 mm. Antennæ: 1, 75μ; 2, 84μ; 3, 315μ; 4, 234μ; 5, 195μ; 6, 102μ; 7, 75μ; 8, 90μ; total, 1.17 mm. *Color* dark brown, with orange or red pigment; all tibiæ and tarsi shaded to yellow; bases of antennal segments 3, 4, 5, and 6 are lemon-yellow.

Head more than twice as long as wide, greatest width across eyes; cheeks roughened, almost parallel, slightly concave close behind eyes, constricted at union with prothorax; frons elevated between bases of first segments of antennæ; back of head transversely striate and with a few short spines set on very small tubercles. *Eyes* large, with conspicuous light-yellow outer borders; with small facets and very faintly pilose. *Ocelli* present, anterior one on apex of head, posterior ones contiguous, with indistinct, light inner margins of eyes. *Mouth cone* broad and short, with blunt tip, and reaching hardly halfway across prosternum. Maxillary palpi two-segmented, basal segment very short; labial palpi very small. *Antennæ* eight-segmented, about twice as long as head; segments 1, 2, 7, and 8, and tips of 4, 5, and 6 brown; tip of 3 light-brown; segment 3 with a long, narrow stalk; segments 4 and 5 similar, but with shorter stalks. Darkened sense area on segment 2; one sense cone on segment 6, two on segments 3 and 5, four on 4, and a row of sense hairs on segment 8.

Prothorax about one-half wider than long, transversely striate; it bears six prominent spines, two on anterior margin, a pair on anterior angles, and a larger pair on the posterior angles. *Mesothorax* with prominent, square, anterior angles; sides almost straight and parallel, with edges roughened, united evenly with metathorax. *Metathorax* with posterior angles broadly rounded. *Legs* long and slender; all femora dark-brown; tibiæ yellow, shaded with brown near the middle; tarsi yellow tipped with brown; trochanters with red pigment. All legs armed with long, stout, yellow spines; these are especially prominent on femora; fore coxæ protruding, forming the prominent angles of the prothorax. *Wings* present, reaching to tip of fourth abdominal segment; membrane white; both pairs with long, simple anterior and posterior fringes of closely arranged hairs; anterior wings double fringed along their posterior distal margin for about half their length; each wing with a single rudimentary vein.

Abdomen with segments 2, 3, and 4 widest and about equal; other segments tapering evenly to base of tube. Tube long and slender and about seven times as long as wide. Segments 2 to 7, inclusive, each closely transversely striate, with a dark transverse line near anterior border. Intersegmental membrane brown, with net structure. When the abdomen is distended the connecting tissue is almost as wide as the segment itself. Segments each with two or three prominent spines on angles.

Male: Head, length 0.58 mm., width 0.23 mm.; prothorax, length 0.23 mm., width 0.42.; metathorax, width 0.73 mm.; abdomen, width 0.72 mm.; tube, length 0.63 mm., width 0.10 mm.; clasper, length 0.66 mm.; total body, length 4.66 mm. As long but somewhat smaller than female. Wings present. A long tube-like clasper projects from either side of segment 6; this is black at the base and shades to yellow-brown, and on the tip it bears a short bulb-like hair. Segments 7 and 8 each have a similar though smaller side projection near the posterior edge; the pair on segment 8 is the larger and is thumb-shaped. Scales present, tube tipped with eight long, clear lemon-yellow hairs and several smaller ones. Posterior half of abdomen and the tubes are very dark brown.

Described from two females and one male.

Food plant: Unknown.

Habitat: Stanford University, Cal.

11. Genus CRYPTOTHRIPS Uzel.

(26) **Cryptothrips californicus** Daniel.

Measurements: Head, length 0.26 mm., width 0.16 mm.; prothorax, length 0.15 mm., width, including prominent coxa, 0.25 mm.; mesothorax, width 0.33 mm.; abdomen, width 0.38 mm.; total body, length 1.7 mm. Antennæ: 1, 24μ; 2, 51μ; 3, 75μ; 4, 69μ; 5, 51μ; 6, 45μ; 7, 42μ; 8, 27μ; total, 0.35 mm. General *color* black, often dark brown under the microscope, with purple pigment.

Head cylindrical, one and one-half times as long as wide; front of head strongly prominent between basal segments of antennæ; sides almost straight and parallel, roughened, converging only slightly posteriorly; back of head transversely striate; head without conspicuous spines, except a single one posterior to each eye. *Eyes* large, prominent, but not protruding, with rather small facets; not pilose. *Ocelli* situated far forward, anterior one on tip of prominent apex. *Mouth cone* broad at base, short, reaching only a little past the middle of the pronotum; maxillary palpi three-segmented and quite long and slender. *Antennæ* with eight segments, separated at base by prominent prolonged vertex; segments 1 and 2 dark brown, unicolorous with head, 3 and base of 4 yellow, others shading brown toward the tip.

Prothorax small, about as long as width of head; sides straight, but extending outward posteriorly, with a prominent blunt spine on each hind angle; the protruding fore coxæ form what appear to be the prominent angles. *Pterthorax* hardly as wide as abdomen, sides almost straight, narrowed abruptly in front, gradually behind. *Legs* long and slender and unicolorous with body; fore coxæ greatly enlarged. *Wings* extending to seventh abdominal segment; both pairs alike, clear white and with long simple fringe on both anterior and posterior margins, excepting fore wings at tips, which are double fringed behind by about six hairs.

Abdomen long and slender; it tapers gradually from second to eighth segments; the ninth segment is small; the tenth, the tube, is very small and slender. Hairs on prominent angles of segments 7, 8, and 9 long and slender; several long and several shorter ones on end of tube. Protruding scales on last abdominal segments of males.

Males similar to but usually somewhat smaller than the females.

Redescribed from many specimens. For original description see Entomological News, 1904, page 293.

This thrips has been found almost exclusively under the old shells of the brown apricot scale (*Lecanium armeniacum* Craw) and the black scale (*Saissetia oleæ* Bern.) and probably feeds on the remains of the old scales.

Habitat: Central and southern California.

LIST OF CALIFORNIA THYSANOPTERA AND THEIR FOOD PLANTS.

Species.	Food plants.
(1) *Orothrips kelloggii*, new species	Manzanita and madroña blossoms.
(2) *Æolothrips kuwanaii*, new species	California lilac (*Ceanothus thyrsiflorus*).
(3) *Æolothrips kuwanaii*, variety *robustus*	(Found on apricot tree.)
(4) *Sericothrips apteris* Daniel	Grass.
(5) *Sericothrips reticulatus*, new species	Grass.
(6) *Sericothrips stanfordii*, new species	Grass.
(7) *Heliothrips hæmorrhoidalis* Bouché	Azaleas, ferns, dahlias, cherry laurel, laurestina.
(8) *Heliothrips fasciatus* Pergande	Oranges, pea vines, wild vetch.
(9) *Euthrips orchidii*, new species	Orchids.
(10) *Euthrips pyri* Daniel	Apricots, apples, almonds, cherries, figs, grapes, pears, prunes, plums, walnuts.
(11) *Euthrips ehrhornii*, new species	Grass.
(12) *Euthrips ulicis californicus*, new variety	Vetch.
(13) *Euthrips minutus*, new species	Grass.
(14) *Euthrips occidentalis* Pergande	Most wild and cultivated flowers.
(15) *Euthrips tritici* Fitch	Grass, alfalfa, California sage (*Artemisia californica*), manzanitas (especially *Arctostaphylos tomentosa*), oranges, roses, lilacs, etc.
(16) *Parthenothrips dracænæ* Heeger	Dracæna.
(17) *Thrips madronii*, new species	Blossoms of madroña, California laurel, and California lilac.

Species.	Food plants.
(18) *Thrips tabaci* Lindeman	Wild and cultivated flowers, onion.
(19) *Thrips bremnerii*, new species	Figs.
(20) *Trichothrips dens*, new species	Apricot.
(21) *Trichothrips femoralis*, new species	Wild mullein.
(22) *Trichothrips ilex*, new species	Christmas berry (*Heteromeles arbutifolia*).
(23) *Trichothrips ilex dumosa*, new variety	Scrub oak (*Quercus dumosa*).
(24) *Acanthothrips doaneii*, new species	Grass.
(25) *Megalothrips hesperus*, new species	Unknown.
(26) *Cryptothrips californicus* Daniel	Unknown (This species has been found under the old shells of the brown apricot scale (*Lecanium armeniacum* Craw) and the black scale (*Saissetia olex* Bern.) and probably feeds on the remains of the old scales.)

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